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# **WHY PROJECT MANAGERS FAIL TO ACT UPON EARLY WARNING SIGNS: EVIDENCE FROM FAILED OFFSHORE-OUTSOURCED SOFTWARE PROJECTS**

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## **Abstract**

*In this increasingly globalized world, ever more software projects originating in high-cost countries are being undertaken by third-party organizations in low-cost countries. These projects, known as offshore-outsourced software development (OOSD) projects, exhibit offshore-specific risks that cause them to be more prone to failures than other types of projects. We investigated 19 failed OOSD projects using the ground theory methodology and analyzed why project managers fail to act on the early warning signs (EWS) of failure. Managers based in India and Switzerland from both the client and vendor sides participated in this research to explore the early stages of project failure. Our analysis of the perception of EWSs of failure has resulted in a four-stage model that explains the process by which issues are resolved between clients and vendors. The stages are: monitoring EWSs, detecting EWSs, acknowledging issues, and addressing issues. We further examined, for each stage, the reasons behind project managers' inability to manage the issues. We have contributed to the information systems literature on failure and on outsourcing by exploring the early failure stages in OOSD projects.*

*Keywords: Early warning signs, offshoring, software development, project failures*

## 1 Introduction

Global revenues from offshore outsourcing passed the USD 60 billion mark in 2010, and the offshore market will in all likelihood experience double-digit growth in the near future (Willcocks, Cullen and Craig, 2010). That such a high growth rate is expected is due to the fact that ongoing globalization continues to offer organizations in high-cost countries access to qualified and inexpensive human resources in low-cost countries like India and China (Lacity et al., 2010). Despite the challenges posed by working across organizational and national boundaries, cost arbitrage remains a compelling reason for these organizations to enter into contracts with IT offshore organizations.

Software development falls into the category of IT activities ideal for contracting out to distant countries: it has a high information density and requires little customer contact or physical presence (Apte and Mason, 1995). On the other hand, its inherent complexities make software development difficult to manage even in conditions of co-location (Sahay, Nicholson and Krishna, 2003). Unlike captive offshoring, which involves a project carried out within the same organization in different countries, offshore outsourcing involves third-party collaboration that generates more risks to the successful development of information systems. Research has shown that offshore-outsourced software development (OOSD) projects are more prone to failure than domestically outsourced projects, because they face offshore-specific risks like differences in national and organizational culture, language, time-zone, and organizational work practices (e.g., Beulen, Ribbers and Roos, 2006; Dibbern, Winkler and Heinzl, 2008; Iacovou and Nakatsu, 2008).

The proper interpretation of project failure remains a matter of contention among practitioners and academics alike, and there seems to be no consensus regarding its definition (Pinto and Mantel 1990). In information systems (IS) research, failures are judged from the implementation perspective (e.g., Flowers, 1996) and from the project development perspective (e.g., Standish, 1995). Several academics and practitioners have reported on failures in offshore software projects from the implementation perspective (e.g., Vashistha and Vashistha, 2005; Rottman and Lacity, 2008). However, there has been a lack of in-depth studies regarding OOSD projects and failures. Little research has addressed project development failures from a team-level perspective that comprises both the client and vendor sides. We adopted the project development perspective to analyze OOSD project cancellations that happen before project implementation is completed. Since contracts form the primary entity of control in IT outsourcing engagements, we adopted the non-fulfillment of contracts as the basis for defining project failures (Kern and Willcocks, 2000). In this paper, we define *project failure as the cancellation of the OOSD project resulting in premature termination of contractual activities between clients and vendors before the information system becomes operational*. This could include projects that were canceled or insourced because of the vendor's inability to implement the information system as well as projects in which the vendor was replaced or the offshore activities were stopped.

The post-mortem examination of project failures has demonstrated that significant early warning signs (EWS) can be found in IT projects before actual project failure (Kappelman, McKeeman and Zhang, 2006). The key to gathering information related to EWSs is the early project collaboration between the partners. The warning signs or risks might be perceived by project managers at the team level by taking note of various indications. For instance, project managers could check whether offshore team members have understood the project specifications using verification checks through workshops or written summaries instead of relying on deliverables; the feedback from deliverables sometimes comes too late to avoid failure, i.e., they are rather late warning signs. The first 20 percent of a project's collaboration forms the critical period during which the stage is set for successful project team organization. Recognition of issues in the early collaboration stages allows project managers to take corrective measures to finish the project as originally planned. Since the client and vendor in an

OOSD project will perhaps not work together in the first 20 percent of the project's life as defined by project initiation at the client organization, we have adopted the following pragmatic definition of EWSs for this research: *EWS is a project state or indication that warns one about possible or impending problems or issues in the first 20 percent of the project's cooperation or collaboration period between clients and vendors* (based on Kappelman et al., 2006).

IS research has not adequately addressed the perception of EWSs of failure. One major reason behind the lack of research into IT outsourcing failures has been the sensitivity of the topic of failures for both clients and vendors (Sparrow, 2003). To remedy this lack of empirical studies regarding perception and management of EWSs of failure, we have carried out an in-depth study of the failure to manage them. Managing the issues early in the project could allow project managers to complete the project according to the original estimates. In order to investigate how project managers involved in OOSD projects recognize and handle project issues, we seek to answer the following research question: *Why do project managers fail to act on early warning signs related to the project team in offshore-outsourced software development projects?*

## **2 Theoretical background**

Ansoff (1975), in his seminal work on strategic issue management, noted that sudden and unfamiliar changes in an organization's environment would result in strategic discontinuity. This discontinuity is first noticed as weak signals; these become more specific and stronger over time. Ansoff proposed a framework to minimize strategic surprises by anticipating strategic risks based on the states of knowledge. The improved knowledge states were based on threats or opportunities (T/O) and included (1) sense of T/O, (2) source of T/O, (3) T/O concrete, (4) response concrete, and (5) outcome concrete.

Nikander and Eloranta's (2001) empirical study indicated the possibility of utilizing EWSs as a project management tool to complement risk management measures. Havelka and Rajkumar's (2006) study, based on the nominal group technique with four focus groups of 20 IS consultants, identified 108 symptoms of troubled software development projects, and included team symptoms as one of the 11 symptom categories. Klakegg et al.'s (2010) analysis of EWSs in complex projects, based on interviews and eight case studies in Norway, the UK, and Australia, discussed the warning signs from the project owners' or governance perspective as opposed to the project management or execution perspective adopted in this paper. That study divided EWSs into two types, namely, hard issues of technical nature, measurable through project assessments, and soft issues related to people, best identified through gut feelings. Nikander and Eloranta's (2001) study also found EWSs that fall into the category of gut feelings by project managers. Klakegg et al. (2010, p. 149), noted that project managers are not always able to act upon EWSs, maintaining that "we do not understand uncertainty well, and we are not good at seeing through complexity or mastering interpersonal effects."

The above empirical works on warning signs took the whole project life as the target of analysis, though Klakegg et al. (2010) differentiated EWSs into three stages: project set-up, early stages, and project execution. By contrast, Kappelman et al. (2006) focused specifically on the first 20 percent of the project lifecycle. In that study, 53 EWSs of failure were identified by 157 experienced IT managers from the IT industry, and differentiated into three risk categories: social subsystem, project management, and technical subsystems. Among the highly rated EWSs, the dominant 12 were all in the social subsystem and project management risk categories. Though this is helpful information, the study fails to shed light on how precisely one can recognize the EWSs.

There are also a number of models aiming to help detect and evaluate early warning signals. Depending on the state of knowledge (Ansoff, 1975) and the available response time, Ansoff and McDonnell (1990) further proposed that the management of weak signals could triage warning signs by examining the impact, signal strength, and urgency of the signal. The priority levels suggested for

issues based on environmental, internal, and performance trends were urgent, postponable, and delayable. In a similar vein, Nikander's (2002) decision support model of EWSs, based on the Ansoff and McDonnell (1990) model, consists of six stages: (1) detection of EWS, (2) interpretation of early warnings, (3) determination of the state of knowledge, (4) identification of problems or risks, (5) exploration of available time, and (6) selection of procedures. Finally, Havelka and Rajkumar (2006) developed a project recovery framework with 12 steps and four stages (recognition, immediate recovery, sustained recovery, and maturity). The strengths of this framework lie in short-term recovery based on immediate steps as well as in sustained project recoveries. None of these models, however, satisfactorily explains the interactions between teams in different organizations.

The principal-agent theory explains the contractual aspects between client (principal) and vendor (agent) in IT outsourcing (Dibbern et al., 2004). The agent is assumed to have access to more private information than the principal, and the consequent information asymmetries allow the agent to hide details and actions during the engagement (Baiman, 1990). Differing perceptions of risks and uncertainties define the actions of actors during the contracting phase (Ross, 1973). The intangible nature of software and the difficulties in monitoring incomplete contracts make software projects a case of agency problem (Keil, Mann and Rai, 2000). Monitoring problems posed by geographical distance and cultural differences explain why OOSD projects cannot be managed as effectively as domestic outsourcing projects.

EWSs provide advance information about project risks; however, they do not provide information regarding the probability and impact of potential problems or issues, which are traditionally handled by risk management measures (Nikander, 2002). Taylor's (2006) study on outsourcing risks found issues that are of an intractable and unforeseen nature. Intractable issues arose despite project managers' best effort to address the risks before the start of the project. Client expectations were found to form the key risk that needed managing to ensure project success. Similarly, Iacovou and Nakatsu's (2008) Delphi survey identified offshore-outsourced risks that organizations needed to consider in order to avoid engagement failures. Out of the 25 risks they identified, 9 were specific to the offshore project environment; they noted that higher risk exposure in offshore projects meant that project managers needed more than basic-level project management skills to execute such projects successfully. Finally, Krishna, Sahay and Walsham (2004) maintained that cross-cultural issues could be managed by addressing them between vendors and clients and thus reaching convergences in practices and adopting approaches to neutralize the cultural misfit.

### **3 Research methodology**

In order to explore the perception and management of EWSs of failure in OOSD projects, we employ the grounded theory methodology in this research (Corbin and Strauss, 2008). Considering the sensitivity of IS failure research and the consequent difficulty of gaining access to project details, this methodology was most appropriate. We conducted semi-structured interviews with Switzerland- as well as India-based project managers from the client and vendor sides. The incomplete script of the semi-structured interview format leaves room for improvising questions and thereby allowed us to obtain the rich details of OOSD projects (Myers and Newman, 2007). Semi-structured interviews were used as a data collection method to "obtain a rich, in-depth experiential account" of failed OOSD projects (Fontana and Frey, 2000).

As part of a larger study on failures in OOSD projects, we contacted the project managers (PM) at major Switzerland-based multinational organizations involved in offshore projects. These PMs were further asked to recommend other PMs with possible experience of failed OOSD projects. Out of the 42 interviews we conducted, this study makes use of 19 interviews with project managers (nine from the client and 10 from the vendor sides). Twenty-three interviews were not used for the analysis, as the failures experienced by those PMs did not come under the category of OOSD project failures.

At the interviews, the PMs narrated the details of a major OOSD project failure in their careers. Though retrospective interviews are prone to recollection errors (Glick et al., 1990), we minimized this problem by focusing on major events and issues in one major failed and one major successful project in the project managers' careers. (Though successful projects are beyond the scope of this paper, we might note that PMs were also asked to provide details of the most successful OOSD project in their careers; these successful projects provided details of the issues that managers noticed and addressed in order to bring the project to a successful conclusion). Table 1 provides the overall career experiences of the project managers we interviewed. The higher average number of OOSD failures on the client side could possibly indicate differences in context for project managers.

	<b>Clients</b>	<b>Vendors</b>
No. of interviewed project managers	9	10
IT-related (average years)	16.56	15.22
OOSD project (average years)	8.33	9.56
Project management (average years)	11.11	8.56
OOSD project management (average years)	7.22	6.11
Average no. of OOSD failures	5.89	1.78
Average no. of OOSD successes	21.67	13.33

*Table 1. Overall career experience of project managers*

The average interview lasted around one hour. We tape-recorded the interviews and transcribed them, producing a total of 255 pages of text. Data coding and analysis were done using MAXQDA 10 software. We employed open and axial coding schemes (Corbin and Strauss, 2008) to build thematic categories of data and to understand the relationships between the emerging concepts and categories. In the initial analysis, open coding was employed to delineate concepts from the data, resulting in a total of 91 concepts. We further used axial coding to relate the emerged concepts to each other. Once theoretical saturation was reached, the emerged concepts were combined to provide explanations for the failure to manage EWSs of failure in OOSD projects.

Table 2 provides an overview of the failed OOSD project cases. It gives a summary of the countries involved in failed OOSD projects, the industry within which the project was executed, and the project phase in which cancellation took place. India was the prime offshore destination in all project cases and thus this study can be considered India-specific. The industries represented in the research include banking, air transport, power generation, public sector, insurance, and automotive. Although some industries, such as banking, could be considered more information-intensive, the results are equally applicable to all industries. Because of the anonymity guaranteed to PMs, we cannot disclose whether the cases were interviewed from the vendor or client side. All project cancellations took place during the last 10 years and involved multinational organizations.

<b>Interview cases</b>	<b>Countries involved</b>	<b>Industry</b>	<b>Cancellation phase</b>
A	Germany (G), India (I), Switzerland (S)	Power generation	Integration and testing (I&T)
B	I, S	Banking	I&T
C	I, S	Insurance	I&T
D	I, S	Banking	I&T
E	I, S	Banking	I&T
F	I, S	Insurance	Requirement analysis (RA)
G	I, S	Banking	I&T

H	I, Singapore, S	Banking	I&T
I	I, S	Air transport	I&T
J	G, I, S	Insurance	I&T
K	I, S	Banking	I&T
L	I, USA	Automotive	I&T
M	I, S, USA	Insurance	RA
N	G, I, S	Public sector	I&T
O	G, I	Automotive	I&T
P	I, S	Public sector	I&T
Q	I, S	Insurance	I&T
R	I, S	Air transport	I&T
S	I, Canada, S	Insurance	RA

Table 2. Failed project cases

Typical project phases included requirement analysis, design, coding, and integration and testing. Early cancellations took place only in the cases F, M, and S, in which the project was canceled in the requirement and analysis phase; the lack of business benefits and project management capabilities were noticed early in the execution. In all other projects, the final decision to cancel the project was taken later in the integration and testing phase.

## 4 Analysis and discussion

Project managers identified EWSs of failure based on the project states or indications of impending issues and problems during the early stages of failed projects in our interviews. Data analysis shows that most project managers failed to act upon the EWSs of failure. However, among the projects that were canceled in the requirements analysis phase, the project managers in cases F and M noticed the inability of their organizations to engage in OOSD projects early enough and stopped the project. Project case S was canceled because of the lack of business benefits to the organization, which should not have started at all.

Our analysis of EWSs of failure shows that successful management of EWSs required four distinct management stages at both the client and the vendor side: monitoring EWSs, detecting EWSs, acknowledging issues, and addressing issues (figure 1). Each EWS developed into a project issue that, unless managed, led to project cancellation. In reality, several project issues combined to produce the circumstances that led to cancellations. Each EWS identified by a project manager was found to be at one of the management stages at any given time during the failed project. Several failure factors were found to affect the management of each EWS stage. The factors that eventually led to project failure in each stage are also listed in figure 1 along with the project cases (in brackets). We discuss each management stage and the failure to manage EWSs of failure in the following section.

A detailed discussion of EWSs with their higher-level categories is beyond the scope of this paper and will be the subject of another publication. The identified higher-level categories in OOSD projects include project team building efforts, common project execution structures, shared context awareness, collaboration between teams, onshore-offshore team coordination capability, and team member competencies.

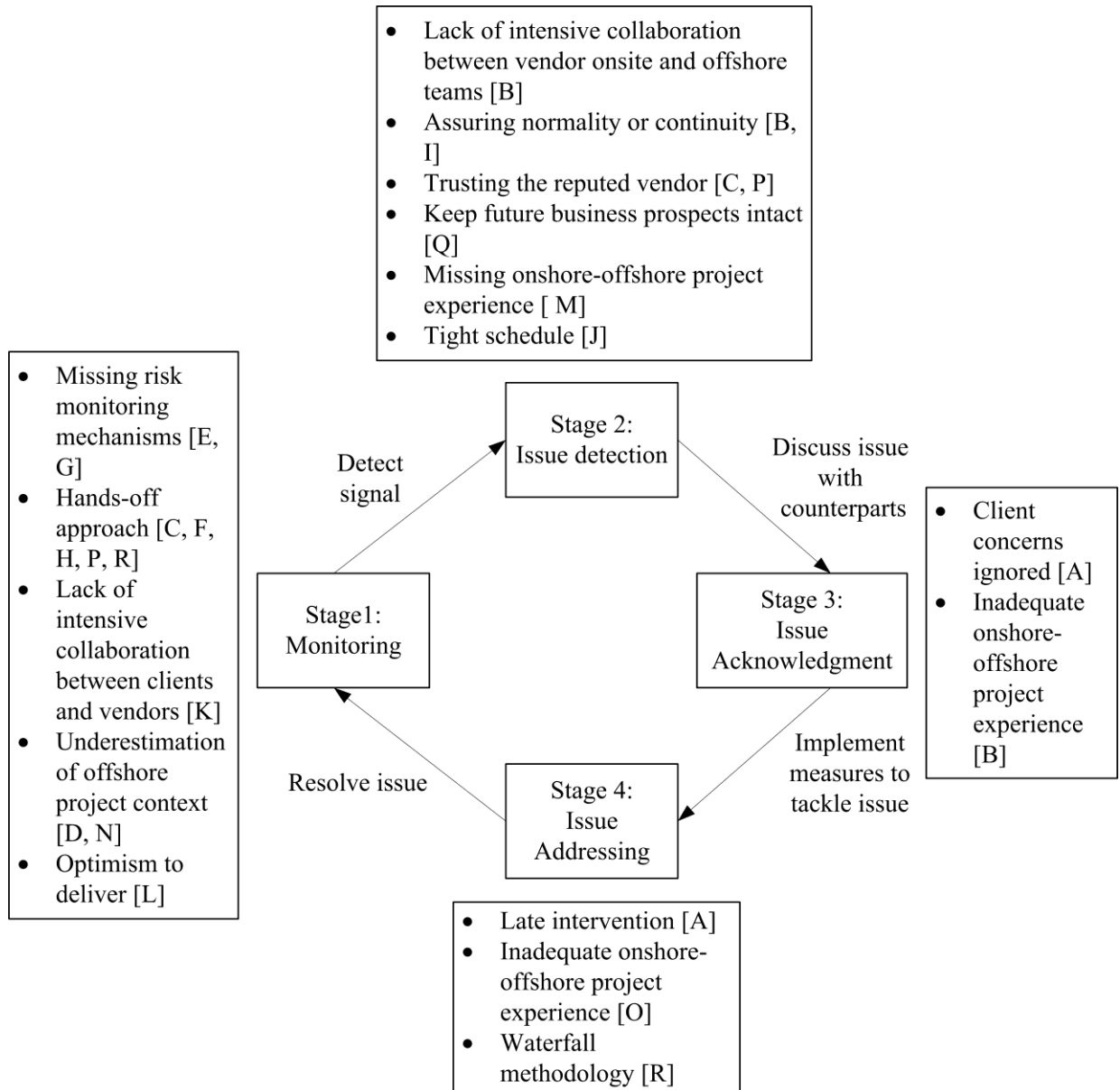


Figure 1. Management stages and failure factors of the EWSs of failure

#### 4.1 Monitoring

The monitoring stage prepares project managers to search for warning signals of issues. Since humans can only selectively perceive and process information (Loosemore, 2000), project managers need to be alert to the information that emerges during project execution and “listen with their ears close to the ground” in order to detect early signals (Ansoff and McDonnell, 1990, p. 386). As issues are considered to be discrepancies between the existing and desired states (Billings, Milburn and Schaalman, 1980), project managers need to have a clear conception of the project context and the expected project state during the execution. Keil and Montealegre (2000) suggested that negative feedback and external pressure could be viewed as warning signs. Of the early signals identified by project managers in retrospect, 27 percent went undetected during the project. In what follows, we discuss the circumstances that led to difficulties in detection during project execution.



Missing risk monitoring mechanism reduces the readiness of project managers to deal with early signals. The failure reason in detecting issues during the early phases was noted by onshore vendor project manager of case E as follows: “It was a bit late. If we had noticed the problem before then we had more chances to maybe save the project. Because in that case we might be in a position to tell to the client openly that yes, this is a problem. Which we did afterwards as well, but then we might have been in a good position to give more solutions to that client during the first 20 percent of the project collaboration.” Lack of risk monitoring reduces the chances of detecting signals and impedes the subsequent ability to provide appropriate responses (Leidner, Pan and Pan, 2009).

Many clients adopt a “hands-off” approach and blindly trust vendors to implement the information system. Unless clients take an active interest in the execution, vendors may take advantage of the information asymmetry (Baiman, 1990). In case H, the client project manager admitted his failure in managing the project: “Of course, the vendor did fail, terribly and miserably, but I would put the blame squarely on our side because we failed in managing. We took a hands-off approach because our priority was obviously at different point in time differently. So we failed to manage it and monitor the progress of the project and in the end we suffered it.”

Other common problems include lack of attention to collaboration and to the complexities of the context. The lack of intensive collaboration between the business and IT teams of clients and vendors in project case K led to many issues that remained undetected. As a result of the organizational structures in these teams, no team took over the responsibilities for project development; therefore, they could not anticipate warnings regarding team collaboration (Watkins and Bazerman, 2003). Underestimating the complexities involved in the offshore project context puts the project execution at risk. This was clear in project cases D and N: difficulties in synchronizing project knowledge with the offshore team became apparent only quite late in the project, when they could no longer be remedied. Project contexts are differentiated by Snowden and Boone (2007) into simple (known knowns), complicated (known unknowns), complex (unknown unknowns), and chaotic (unknowables). In our analyses, failed project cases experienced either complicated or complex contexts, in which “unknowns” dominated. The definition of the context also depends on the experience of the project managers: PMs with insufficient offshore project experience might find the context complex, while greater experience would make the context merely complicated.

The need to take problems seriously is well illustrated by project case L, where the excessive optimism of the vendor PM regarding keeping initially agreed milestones resulted in poor deliverables with each slipping milestone. To avoid displeasing the American client, the PM kept agreeing to deliver according to the original plan instead of reviewing it. The project was canceled by the client after three missed milestones. Optimism bias was found to be one of the key barriers to detecting EWSs during the project execution as it can inhibit PMs’ ability to look for warning signs (Klakegg et al., 2010).

## **4.2 Detection**

In retrospect, 73 percent of 83 identified early signals in failed projects were detected during the project execution; the rest remained undetected in this phase. Once the early signals are detected, the issues involved need to be identified using the state of knowledge (Ansoff, 1975). Because of the difficulties in collaboration between vendors and clients in the onshore-offshore project context, the detected signals may not easily lead to the identification of issues. Only the team-building effort category appeared to have more undetected than detected early signals during the project execution. In particular, the early warning issue of missing team-building exercises by client and vendor remained unnoticed during the project, potentially pointing to less focus on team building in OOSD than other types of projects.

The client project manager of case B found that the underlying problem could not be solved by the client even though the issues were detected and discussed with the vendor manager. The vendor organizations at onshore and offshore locations worked as independent organizations and did not effectively collaborate to solve the issues raised regarding the banking application that was to be the end product of the project. Such organizational set-ups require the principal (clients) to trust the agent (vendors) to fulfill the assurance of normality given because of the inherent information asymmetries (Baiman, 1990). Further, the clients in cases C and P trusted the reputed vendors to solve the issues even after noticing them. This psychological barrier to carry on with projects was called optimism bias by Flyvbjerg, Holm and Buhl (2002).

In a similar vein, an interest in keeping future business prospects intact led both client and vendor PMs to exhibit a “mum-effect” in case Q (Keil and Robey, 2001). Both lacked interest in taking up issues regarding incompatible technical design. As the vendor PM project manager noted: “From a vendor perspective when the first concerns were raised there was a massive – I’ll use a technical term – freak out on the customer side. And on the vendor side – I was on the vendor side raising concerns. Both parties immediately became polarized. It was in the context of a much larger additional transaction covering overall outsourcing engagement. So both parties wanted the noise to go away quickly for the sake of a much larger transaction.”

The client PM’s lack of onshore-offshore project coordination experience caused the cancellation of project M, which was one of the first offshore projects in the client organization. Although the manager could pick up the EWI of lack of team coordination, it could not be acted upon as there was no further support in the organization (Klakegg et al., 2010). Tight schedules may also result in project cancellation, although in project J the issue of missing competent resources was detected. Williams (2012) found that time pressure could lead to a situation in which EWSs cannot be identified early enough in order to be acted upon effectively.

### **4.3 Acknowledgment**

This stage involves the acknowledgement of the existence of EWIs by both vendors and clients. Mutual admission of issues could express the willingness to resolve them (Havelka and Rajkumar, 2006). This results in the project partners having a shared understanding of warnings. Our data analysis showed that only 33 percent of the detected early signals were acknowledged between the vendor and client teams. The low number of acknowledged issues shows the difficulty of entering this stage. In project case A, the client manager expressed his concerns to the vendor manager, but the latter never acknowledged them as a problem that required attention. This disregard of concerns corresponds to the “deaf-effect” of managers when concerns regarding risks in failing projects are raised (Keil and Robey, 2001). The cognitive bias of the human mind leads managers to underestimate and ignore many issues. This bias is the consequence of the human tendency to see issues as they would like them to be to rather as they actually are (Watkins and Bazerman, 2003).

The client project manager in project case B noted the difficulties regarding issue acknowledgment among vendors and clients as follows: “It was only possible to escalate and to bring the facts, and if they say, “Everything is under control, there is no issue” and what you can see is only some, maybe clouds outside, but there is no rain. Okay, hopefully it’s true, but again, it was not true.” Information asymmetry around the raised issues puts the client manager in a difficult position as he cannot oversee the situation in the offshore site (Keil, Mann and Rai, 2000). The experiences of the project manager at the vendor organization also played a role since he was not aware of the organizational and professional culture in the offshore context and did not openly admit problems in technical design.

Failure to acknowledge EWIs suggests the existence of a barrier that seems difficult to overcome in the onshore-offshore context. Indian managers tend to be culturally bound by the mum-effect because of their culture’s lack of openness in communication (Keil and Robey, 2001). The determination to

resolve acknowledged issues (Havelka and Rajkumar, 2006) sets the stage for addressing them in the next step.

#### **4.4 Addressing**

This stage involves the vendor or client agreeing to resolve issues and to take measures to do so in a timely manner. The state of knowledge and available time determine the measures required for solving issues (Ansoff and McDonnell, 1990). The solution process could also include finding the root causes of issues. Of the early signals detected in the first stage, only 18 percent were identified as issues and addressed in this stage, showing how hard it is to resolve issues between vendors and clients during project execution. Klakegg et al.'s (2010) case studies suggested that EWSs detected during the project could not always be acted upon. The issues addressed need also to be monitored for recurrence by detecting further early signals, which makes the EWS management model a cyclic one.

If issues are addressed late, the efforts that go into the detection of EWSs could become unrewarding. To allow adequate response time, EWSs must be prioritized based on their impact and urgency (Ansoff and McDonnell, 1990). An example is project case A, where the client project manager found himself facing a vendor's refusal to address problems promptly: "The delivery management would then say that, 'Look these are just starting problems and we are just...we'll go into a more, let's say, stable phase. It's just this kind of inception problems that we have.'" Even though the issues regarding team member competencies were acknowledged by both sides, the decision to introduce new members came late for the client. That Indians perceive time differently from the Western view of clock time could be attributed to the timeless Hindu view of time (Saunders, Van Slyke and Vogel, 2004).

Missing onshore-offshore project experience seems to have played a major role in the inability to solve most issues. The experienced offshore project manager in case O found it difficult to address the issues properly, as his counterpart at the client site, who was new to offshore projects, did not offer the required cooperation. Iacovou and Nakatsu (2008) noted the need for client managers to possess project management skills if failures are to be avoided. However, in order to address the identified issues in the onshore-offshore context, both client and vendor PMs are required to have the knowledge and capacity to overcome offshore-specific risks. The experience and competencies of project managers played a role in detecting especially people-related issues through gut feelings, as well as in addressing EWSs during project execution (Klakegg et al., 2010). The management stages of EWSs show that a clear understanding of the onshore-offshore project environment plays a major role in avoiding such predictable surprises (Watkins and Bazerman, 2003).

The use of waterfall methodology was another factor that hindered the early addressing of issues, as the deliverables could only be verified late, at the end of each phase. Only the project manager of case R noted this as the underlying problem that issues were not addressed sufficiently early, even though all but project Q, which employed agile methodology, used waterfall methodology. The predominance of the waterfall model could only be explained by its ability to delineate clearly the activities to be executed onshore and offshore (Sakthivel, 2012).

## **5 Conclusions**

We have investigated why project managers fail to act upon the presence of early warning signs (EWS) of failure in offshore-outsourced software development projects (OOSD). The research has shown the difficulties in managing the detected EWSs during the project. This paper has made two main contributions. Firstly, we have developed a cyclic four-stage model for the management of EWSs; the model's stages consist of monitoring EWSs, detecting EWSs, acknowledging issues, and addressing issues. Each ascending stage was found to be increasingly difficult to reach. This model could be applied by practitioners to identify and assess the warning issues in the fast-paced project world. Secondly, we characterized the reasons for the failure of the management of EWSs in each

stage of OOSD projects. Experience and understanding of offshore-onshore projects were found to be relevant for project managers to detect and manage EWSs in OOSD projects. Further, the use of waterfall methodology in offshore software projects was found to hinder the management of EWSs. Most projects in practice tend to use waterfall methodology because of its ease of use as well as its clear delineation of activities at offshore and onshore locations.

A detailed analysis of EWSs with their categories as well as concrete solutions for managing each EWS is beyond the scope of this paper and is provided in a different publication. The main limitation of our research is its India-centricity, as that could point to bias in the data; on the other hand, having a homogenous cultural sample involving a single vendor country enabled us to develop generalizations. Another limitation was that as we relied on the experiences of project managers involved in OOSD project failures, we had to limit ourselves to one side of the failure story, which in itself is a sensitive topic. Case study research involving both the failing sides could shed more light on the processes that lead to failure. We urge researchers to undertake more analysis involving both sides of failure, should such rare opportunities become available.

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